Incentives to sustain forest ecosystem services

A review and lessons for REDD

Ivan Bond, Maryanne Grieg-Gran, Sheila Wertz-Kanounnikoff, Peter Hazlewood, Sven Wunder and Arild Angelsen

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Acronyms

5MHP	5 Million Hectare Reforestation Programme (Vietnam)
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources (Zimbabwe)
CBFM	Community-based forest management (Tanzania)
CBNRM	Community-based natural resource management
CDM	Clean Development Mechanism
CIFOR	Center for International Forestry Research (Indonesia)
COMIFAC	The Central African Forest Commission
COP	Conference of the Parties
DRC	The Democratic Republic of Congo
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FLEGT	The EU's Forest Law Enforcement, Governance and Trade Programme
FPIC	Free, prior and informed consent
GIS	Geographic information system
IIASA	International Institute for Applied Systems Analysis
IIED	International Institute for Environment and Development (UK)
LiDAR	Light detection and ranging
N-CFI	Norway International Climate and Forest Initiative
NACSO	Namibia Association of Community Based Natural Resource Management Support Organisations
NFP	National Forest Programme
NFPF	The FAO's National Forest Programme Facility
NK-CAP	Noel Kempff Mercado Climate Action Project (Bolivia)
PES	Payments for ecosystem services
PSA-H	Payments for Hydrological Services (Mexico)
REDD	Reducing Emissions from Deforestation and Forest Degradation
RUPES	Rewarding Upland Poor for Environmental Services (Indonesia)
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
VPAs	Voluntary partnership agreements
WRI	World Resources Institute

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This report contains preliminary research, analysis, findings and recommendations to stimulate timely discussion and critical feedback. The opinions expressed here are those of the authors and not necessarily those of the institutions involved, nor the Norwegian Government.

Preface

Natural ecosystems provide a wide range of ecosystem services from which people benefit, and upon which all life depends. These include provision of food, fuel, building materials, freshwater, climate regulation, flood control, nutrient and waste management, maintenance of biodiversity, and cultural services, to name a few.

While the benefits of environmental services are public goods, the cost of ensuring their provision often falls on local land managers. As land is usually managed for private benefit, it is generally more attractive for land managers to convert their land to alternative uses such as agriculture rather than maintain it in its natural state. As a result, natural ecosystems continue to be degraded or lost at an alarming rate. The 2005 Millennium Ecosystem Assessment shows that nearly two-thirds of the world's ecosystems are now under threat.

The emergence of the concept of payments for ecosystem services has raised expectations among many stakeholders that ecosystems can be conserved through popular payments to ecosystem service providers rather than through unpopular measures of command and control. The basic logic is simple: those that provide ecosystem services by foregoing alternative uses of the land should be compensated by the beneficiaries of that service. The principle is increasingly being applied in broader contexts beyond conservation, including the maintenance of cultivated landscapes, water supply and – most recently – for mitigating climate change.

Tropical deforestation happens because it is more profitable to cut down forests than to look after them. However, the emissions from deforestation and degradation of forests make up close to 20 per cent of the global emissions of greenhouse gases. Reducing these emissions represents one of the fastest, most significant and cost-effective option for slowing down climate change in the near term.

Perhaps the most important opportunity currently is for 'forest carbon' payments. These payments can occur either for carbon sequestration (deriving from the net absorption of carbon dioxide in planted trees) or by protecting carbon stocks – which would otherwise be emitted – in natural forests.

The findings of this report are that payments for ecosystem services can create incentives for reducing emissions from deforestation and degradation. They are, however, not a universal panacea. A crucial issue is the overall national and forest governance framework. Under conditions of weak governance it is very difficult for payments for ecosystem services to be effective.

If the providers of ecosystem services can be fairly rewarded there is good chance of reducing tropical deforestation and mitigating greenhouse gas production. These ideas are being implemented in pioneering efforts around the world. The challenge ahead is to replicate, scale up, and sustain these pioneering efforts. This requires major advances in the scientific understanding of natural capital, as well as in the design and implementation of finance mechanisms and supporting policies and institutions. My hope is that this assessment of the potential for ecosystem services can contribute to just that.

Erik Solheim
Minister of the Environment and International Development,
Government of Norway.

Photo: Martin / Andia.fr / Still Pictures

Many indigenous communities have been forced out of the forest by land-use change, particularly for commercial agriculture.

Executive summary

Forest loss, primarily tropical deforestation and forest degradation, accounts for approximately 17 per cent of global greenhouse gas emissions (Rogner *et al.* 2007). Reducing emissions from deforestation and forest degradation (REDD) in developing countries is thus an important component of a viable global climate policy framework, and has captured international attention as a potentially effective and low-cost climate change mitigation option (IPCC 2007a; Stern 2006). As further detailed below, this report focuses on national and sub-national aspects of REDD activities, with a particular focus on the role of performance-based payments for avoided deforestation and forest degradation in developing countries.

In December 2007, during the United Nations Framework Convention on Climate Change (UNFCCC) COP 13, Norway's Prime Minister launched 'Norway's International Climate and Forest Initiative (N-CFI)' with funding of up to NOK 3 billion[1] (currently about US$430 millon) a year. To help inform the design and implementation of programmes supported by the Norwegian Climate Forest Initiative, the Norwegian Royal Ministry of Foreign Affairs commissioned IIED, CIFOR, and WRI to carry out a joint study that would review lessons for REDD from: 1) experience with payment for ecosystem services (PES) approaches in Africa, Southeast Asia and Latin America; and 2) selected cross-cutting technical issues relevant for REDD including, *inter alia*, baseline setting, monitoring of forest emissions, and equity and cost aspects.

Methodology and approach

The review of PES projects and programmes is based upon 13 selected cases studies from the four regions; it includes two wildlife-based programmes and one forestry-based programme in the miombo ecosystem of eastern and southern Africa. The approach is limited by the paucity of robust analyses of the PES programmes and projects in particular, and in some cases the limited life span of the initiatives upon which to base analyses of the effectiveness, efficiency, equity and livelihood impacts. The review of PES and the selected cross-cutting issues are all based on literature available at the time.

Summary conclusions and recommendations

1. Can PES be an effective instrument for REDD?

Despite the limitations in the case studies and literature that has been reviewed, this analysis has found that payments for ecosystem services do have a role to play in the reduction of deforestation and forest degradation. There are, however, regional differences in the adoption of PES that need to be recognised. In Latin America, PES is a known tool that is being used. In Southeast Asia, it is a tool

1. This report uses short scale billion, one thousand million or 10^9.

that is starting to be developed while in Africa there are very few examples of PES projects and programmes. The key innovation that differentiates PES from other conservation tools is the element of conditionality.

Recommendation: performance payments, whether market- or fund-based, will be an important element of national and sub-national REDD mechanisms. However, if certain up-front conditions are not met, it is unlikely that PES will be an effective instrument for REDD. These up-front conditions include economic, institutional, informational and cultural conditions (Wunder 2008b). In these cases, investments in improved governance structures or other enabling policies and measures are more effective. The N-CFI, in collaboration with the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD) and the Forest Carbon Partnership Facility (FCPF), could develop an operational framework of minimum conditions for PES in the form of a toolkit (with indicators) as means to assess whether PES-type performance payments are likely to be effective or what type of other investments are necessary.

2. Can payments for REDD also improve equity and livelihoods?

Concern has been expressed that PES schemes could have negative impacts on poor people. This review finds no evidence of adverse effects on livelihoods and equity. Where schemes have made concerted efforts to target poor and marginalised groups, there have generally been positive, if somewhat marginal, benefits. However, if and when REDD payments are implemented at much larger spatial scales and/or where governance is weak, facilitators and brokers will have to guard against elite capture and more attention will have to be given to strengthening the land tenure of local communities.

Recommendation: the N-CFI should closely monitor pilot initiatives, including the socio-economic impacts on poor households that are both directly and indirectly affected by REDD activities. Through rigorous monitoring and assessment of poverty effects, and building on recent and emerging work on REDD and the poor, the N-CFI and partner countries can tailor REDD strategies to better respond to country-specific conditions and needs.

3. What are the costs of reducing forest emissions?

Opportunity costs for landholders are an important component of the total cost of implementing a PES-type REDD scheme. There is much variation in cost estimates, but there is general agreement that paying landholders to conserve forests is likely to be a cost-effective greenhouse gas mitigation option – although overall costs are likely higher than suggested by the Stern Review. For an indication of total costs of REDD as a climate change mitigation option compared to alternatives, the use of global simulation models seems adequate. Local models are useful complements to global estimates, in particular for capturing sub-national or sub-regional variations in opportunity costs.

Recommendation: to support the design of more cost-effective PES-type REDD schemes, it is recommended to experiment with procurement auctions and similar methods that aim to more fully reveal opportunity cost information. This is in line with contemporary PES literature. In addition, information is needed on the level of transaction costs associated with alternative payment approaches, in order to assess the overall costs of a REDD action. The N-CFI could thus survey the transaction costs arising at different stages of establishing and implementing PES-type REDD schemes and develop guidelines on how to keep these costs to a minimum. This could be similar to the three-tier approach used by the IPCC Guidelines for land-use and forestry projects, where alternative methods are proposed depending on existing resources and capacity.

4. What is the role of forest governance?

A PES approach to REDD requires effective and equitable governance frameworks and systems, such as clarity of land rights and functioning monitoring to enable the enforcement of conditionality and quid pro quo payments. However, in many areas where deforestation and degradation are at their highest, governance is weak and is an underlying cause of deforestation and forest degradation. Importantly, governance can vary considerably across a single country (e.g., Brazil).

Recommendation: it is naïve to believe that it is easy to change and improve forest governance – there are many deep and vested interests in maintaining the *status quo*. Strengthening forest governance will require strong and fair rules, rights, and institutions at all administrative levels – national to local – as well as civil society participation. The N-CFI could assess the minimum governance conditions needed for REDD action to function effectively, taking into account different country contexts. A common framework for assessing governance of forests in relation to REDD could help to identify gaps and problems as well as verify improvements.[2] It is important that any framework be comprehensive while also narrow enough to capture the most important issues from the perspective of REDD, and could be used to help satisfy standards for 'good' emission reduction activities or to review a country's readiness to participate in REDD. The framework could become guidelines on the type of investments feasible in alternative governance contexts that would be highly useful and beneficial for future REDD investments.

5. How will reductions in forest emissions be measured?

Cost-effective tools and methodologies to measure carbon stocks are essential in establishing permanent and additional reductions in deforestation and forest degradation. There are sound reasons to believe that the remaining technical challenges are likely to be overcome in the near future. While remote sensing plays an important role for deforestation monitoring, ground-based measurements are needed for validation and assessments of degradation.

2. Such a framework is currently under development by WRI and partners with support from the Government of Norway.

Establishing baselines or 'reference levels' is both a technical and a political issue. The major political challenges refer to the decision on the time period or time point to be used in estimating reference levels and for the establishment of crediting lines. Transparent baseline rules are needed. The more universal the rules the more transaction costs can be reduced. Our review of PES case studies revealed that baseline studies were mostly cursory or even completely absent. While the use of such 'implicit baselines' (where a continuation of the 'business as usual' scenario is assumed) may work in the context of PES, this is very unlikely to work for REDD.

Recommendations: providing access to free or low-cost fine-resolution imagery is key, as is support to countries to set up national REDD monitoring infrastructures. Regional partnerships for acquiring and developing appropriate methods, or sharing experiences from Annex I countries on their approaches to monitoring, verifying and reporting changes in forest carbon stocks, could be further avenues to develop capacity and reduce costs.

Strong consideration should be given to establishing an independent international forest carbon monitoring institution. Such an independent institution could help to ensure reliable, unbiased monitoring at the national level and help to overcome capacity shortcomings. Leaving the monitoring task to each supplier country may create incentives for biased monitoring to reap carbon benefits. Centralising this task at global level can further benefit from economies of scale and render monitoring far more cost-effective than ensuring coherent monitoring by each country, and will provide more coherent time-series of deforestation data for baseline purposes.

Learning lessons for REDD

We believe that the N-FCI is uniquely placed to catalyse a culture of learning and sharing among all the stakeholders who are involved with REDD. At the country level, this could entail supporting the establishment of a multi-stakeholder 'learning group' approach to conduct diagnostics of what really works and what does not. At the global level, we propose that the N-CFI collaborate with UN-REDD and the FCPF to investigate appropriate fora to promote information exchange, learning and capacity-building. The Stockholm Water Week is a good model – it is widely recognised as the pre-eminent meeting for the water and sanitation community, it is a regular event convened annually by the same organisation, and it brings together the full range of stakeholders involved in water and sanitation. A similar event – the 'Oslo REDD Exchange' – could bring together the diverse and multiple stakeholders in the REDD community. In addition, the N-CFI needs to maintain support for other fora, especially those that promote south-south dialogue and that have been shown to address the particularly complex issues of governance at the national level.

Introduction

Emissions from land-use change, primarily tropical deforestation and forest degradation,[3] contribute to an estimated 20 per cent of total anthropogenic greenhouse gas emissions (IPCC 2007b). Reducing emissions from deforestation and forest degradation in developing countries (REDD) would thus seem to be an important component of a viable global climate policy framework, and has now captured international attention as a potentially effective and low-cost climate change mitigation option (IPCC 2007a; Stern 2006). This report focuses on a number of critical issues for the design and implementation of national and sub-national REDD activities, with a focus on the role of performance-based incentive mechanisms and key enabling conditions for their effective implementation.

1.1 The role of forests in a post-2012 international climate regime

Forestry and land use have had a limited role as mitigation options under the Kyoto Protocol and its flexible mechanisms – the Clean Development Mechanism (CDM) and Joint Implementation. The reasons have been both political and methodological, including:

- Concerns about technical difficulties in accurately measuring greenhouse gas emissions from deforestation, and the risk of leakage.
- At the negotiation level, when the CDM mechanism was decided on in 2001 (UNFCCC COP 7 in Marrakesh), the emission targets for Annex I countries had already been set, therefore including avoided deforestation would not have yielded any additional reductions.
- More generally, a perceived risk of effort dilution through cheaper 'avoided deforestation' in developing countries, rather than more costly adoption and development of cleaner technologies in Annex I countries.

Decisions taken at the 2007 Conference of the Parties to the UNFCCC in Bali (COP 13) reopened the possibility for REDD to become part of a post-2012 global climate regime. Consequently, a number of developed-country governments and international development agencies have forged high-level partnerships and allocated substantial new funds to help prepare countries for participation in a future REDD regime, including support for capacity-building, pilot demonstration activities, and other policies and measures to achieve reduced forest emissions. While debate grows over the international architecture of a REDD mechanism and negotiations continue in various UNFCCC fora, more attention needs to be focused on how performance-based payments and other approaches to REDD

3. This report recognises the challenges of defining forests, woodlands, and the extent of the reduction that constitutes deforestation and degradation. For example, the UNFCCC definition of a forest is 'a minimum area of 0.05 to 1.0 hectares with a tree crown cover of more than 10%–30% with trees with the potential to reach a minimum height of 2 to 5 meters at maturity in situ'. (Source: UNFCCC, *Marrakesh Accords,* 21-01-2002)

would operate at national and local levels; the priorities for up-front investment to strengthen country capacity to implement REDD; and how REDD mechanisms can be designed to maximise co-benefits for forest-dependent communities and biodiversity conservation.

1.2 Norway's International Climate and Forest Initiative

In December 2007, during the UNFCCC's COP 13, Norway's Prime Minister launched 'Norway's International Climate and Forest Initiative (N-CFI)', and announced that Norway is prepared to allocate up to NOK 3 billion a year over a period of five years toward efforts to reduce greenhouse gas emissions from deforestation and forest degradation in developing countries (including all types of tropical forests). Box 1 outlines the initiative's goals and strategies. The N-CFI specifically recognises that REDD efforts should contribute to securing indigenous peoples' rights, improving the livelihoods of forest-dependent communities, and to conserving forest biodiversity.

Box 1. Norway's International Climate and Forest Initiative

Goals:

1. To work towards the inclusion of emissions from deforestation and forest degradation in a new international climate regime.
2. To take early action to achieve cost-effective and verifiable reductions in greenhouse gas emissions.
3. To promote the conservation of natural forests to maintain their carbon storage capacity.

Strategies:

1. Establish a credible system for monitoring, assessment, reporting and verification of reductions in emissions from deforestation and forest degradation.
2. Establish a robust, effective and flexible international architecture.
3. Commitment by countries developing and implementing national REDD strategies to protecting the rights of local people and their opportunities for development.
4. Cooperation with selected NGOs, both at strategic level and in individual forest countries, and with relevant research institutions at national and international level.
5. Capacity-building in the recipient countries prioritised in the preliminary phase of the initiative.
6. Develop support for performance-based initiatives to reduce deforestation and forest degradation.
7. Seek to ensure that Norway's initiative acts as a catalyst for contributions from other countries.
8. Ensure systematic evaluation of supported projects and programmes, both to determine whether support should be continued and with a view to ensuring systematic transfer of learning.

Adapted from *The Government of Norway's International Climate and Forest Initiative*. See: www.regjeringen.no/en/dep/md/Selected-topics/klima/why-a-climate-and-forest-initiative.html?id=526489

Photo: Biosphoto / Gunther Michel / Still Pictures

Logging and poor management is leading the loss of approximately 400,000 hectares of tropical forest in the Congo Basin each year.

1.3 Objectives and scope of the review

In support of the N-CFI, the Norwegian Royal Ministry of Foreign Affairs commissioned the International Institute for Environment and Development (IIED), the Center for International Forestry Research (CIFOR), and the World Resources Institute (WRI) to carry out a joint review to help inform the design and implementation of national and sub-national REDD mechanisms. The review had three objectives:

Objective 1: to review the design and performance of selected 'payments for ecosystem services' (PES) and other incentive-based initiatives in four major tropical forest regions that are broadly aligned with the geographic focus of the N-CFI: the Amazon Basin, the Congo Basin, the miombo woodlands of eastern and southern Africa, and Southeast Asia (Section 2 of the report).

Objective 2: to review the current state of knowledge on key cross-cutting issues related to payments for avoided deforestation and forest degradation, and the challenges they pose for REDD, including, inter alia, estimating the costs of REDD, improving governance of forests, and measuring forest emission reductions (Section 3 of the report).

Objective 3: to produce recommendations and design criteria for Norway's International Climate and Forest Initiative (Section 4 of the report).

The results of the review are presented in ten background papers (see Appendix 1) and this Summary Report. It is important to note that the study is based on a literature review and no primary research was undertaken. Furthermore, the small sample size of 13 PES examples and the general paucity of available data limited the depth and rigour of the review. Limited peer review has been undertaken within each organisation and an independent external review of the summary document was done by researchers at the Norwegian University of Life Sciences Oslo, Norway. An earlier version of the study was presented and discussed at a Forest Day 2 side event during the UNFCCC COP 14 in Poznan, Poland. Appendix 2 provides the detailed Terms of Reference for the study.

2

Incentives for forest ecosystem services: A review of selected cases

Intact forests and woodlands provide a range of ecosystem services such as maintenance of water supply and quality, carbon sequestration, and a host of other benefits derived from biodiversity. Because most ecosystem services are not traded, there are no observable prices to regulate their supply and demand, and there are weak economic incentives to promote their sustainable management and use. One solution to this dilemma is to create markets or market-like systems that internalise the costs and benefits of supplying the services (Barbier and Swanson 1992). For land-based ecosystem services, beneficiaries can provide direct incentives to land managers for service provision. This approach has been termed 'payments for ecosystem (environmental) services' or PES (Landell-Mills and Porras 2002).

A robust and increasingly accepted definition of PES is provided by Wunder (2005), who proposes five key criteria that are:

- a voluntary transaction in which
- a well-defined environmental service (ES) or a land use likely to secure that service
- is being purchased by at least one ES buyer
- from at least one ES provider
- if, and only if, the ES provider ensures the supply of the ES (conditionality).

The voluntary nature of the transaction separates PES from the conventional command-and-control approach of many governments. The clear definition of the ecosystem service implies that the service, or at least a land-use proxy for it, can be measured, e.g., tonnes of carbon sequestered, or the turbidity levels in water. Structuring the arrangement as a relationship between a buyer and an ecosystem service seller clearly defines the principals and counters the tendency for third parties to appropriate the financial benefits. The conditionality criterion (contingency) serves to separate PES from many other incentive-based resource management approaches. In its simplest form, it means that the payment will only be made when the providers of the service implement the agreed land-use changes. The arrangement can be refined so that payment is scaled to performance. This strict definition severely limits the number of working PES examples to some initiatives in 'developed economies, Costa Rica and some dozen other experiences, mostly in Latin America' (Wunder 2005).

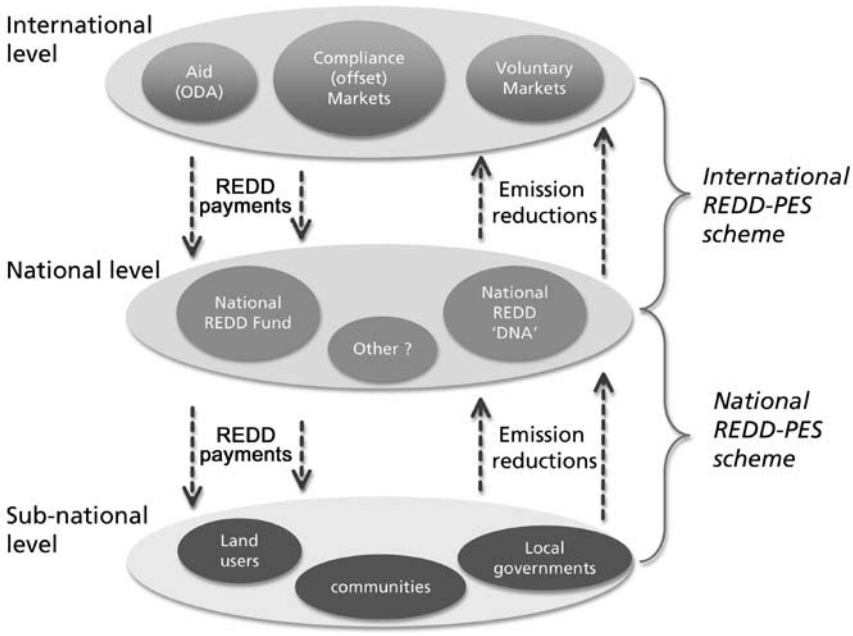
Conceptually, a REDD mechanism can be viewed as a multi-level PES scheme, as shown in Figure 1 (Angelsen and Wertz-Kanounnikoff 2008). The REDD scheme can be either:

- An international REDD-PES scheme, wherein performance payments for reduced

forest emissions are made between countries, or between the private sector and countries; or

- A national REDD-PES scheme, wherein performance payments are made between national governments (or another intermediary agency) and local governments or land managers in exchange for on-the-ground emissions reductions.

Figure 1. Conceptual model of multi-level REDD-PES scheme



Angelsen and Wertz-Kanounnikoff 2008

This review focuses on the national and sub-national levels, and looks at 13 case studies (Table 1) from the four regions that reflect key features of PES-type schemes: i) payment design features; ii) effectiveness and efficiency; iii) equity or distributional impacts; and iv) livelihood impacts on households (Wunder *et al.* 2008). This includes the role of incentives in selected examples of community-based natural resource management (CBNRM) programmes. In many of these programmes, devolution of responsibility has been accompanied by fiscal benefits to the communities. In some of the wildlife-based programmes of eastern and southern Africa, the incentives from these programmes have been substantial, especially at the local scale (i.e., to communities) and in cases to local governments.

Table 1. Selected PES and CBNRM programmes by region[4]

Amazon Basin	Congo Basin	Miombo region	S.E. Asia
1. Noel Kempff Mercado Climate Action Project (NK-CAP), Bolivia. 2. Bolsa Floresta, Brazil. 3. Pimampiro, Ecuador. 4. Payments for Hydrological Services (PSA-H), Mexico.	5. Ibi Batéké Carbon Sink Plantation, Democratic Republic of Congo.	6. Nhambita Community Carbon Project (Mozambique). 7. Communal land wildlife conservancies, Namibia. 8. Community-based forest management (CBFM), Tanzania. 9. Communal Areas Management Programme for Indigenous Resources (CAMPFIRE), Zimbabwe.	10. Rewarding Upland Poor for Environmental Services programme (RUPES), Sumberjaya, Indonesia. 11. RUPES, Singkarak, Indonesia. 12. The 5 Million Hectare Reforestation Programme (5MHP), Vietnam. 13. Ulu Masen, Indonesia.

Reflecting the source of financing, two broad categories of PES schemes can be distinguished (Wunder *et al.* 2008):

- **Government-financed:** the government acts as the service buyer. These programmes typically feature multiple services and side-objectives, and are not immune from changes in public policy and the allocation of government funding. Their large scale allows them to exploit certain administrative economies of scale, and thus achieve cost efficiencies.
- **User-financed:** the users (e.g., water and energy companies, municipalities) pay for the ecosystem service directly. These programmes are smaller, typically single-service focused (mainly carbon and watershed protection services), and more spatially targeted. They thus tend to be more efficient than government-run schemes. However, they are more expensive to set up, so often may be less cost-efficient per hectare covered.

Of the selected sample used for our analysis, four of the initiatives are government-financed and five are user-financed. In addition, there are projects that do not satisfy the five PES criteria but which have strong elements of economic incentives (Table 2). Three community-based natural resource management programmes from the miombo woodlands region are based on 'other economic incentives', which we use as a third category. For the two wildlife-based programmes in Namibia and Zimbabwe, revenue is primarily from the sale of user-rights to private sector hunting and tourism operators. Meanwhile in Tanzania, village forest committees derive their revenue largely from the sale of permits (for wood, wood fuel, and

4. Brief narrative descriptions of each of the projects are provided in Background papers 1-4.

charcoal) and the collection of penalties. Both the wildlife and forestry CBNRM programmes show the importance of a legal and policy framework that confers strong proprietorship over natural resources (Namibia), and the challenges of creating incentives at community and household level (Zimbabwe and Namibia).

The geographical scale of the selected case studies varies considerably, from just 496 ha to over 1 million ha (Table 3). There is a close relationship between the geographical scale of the cases and their funding sources – an aspect that is confirmed in the PES literature (Wunder *et al.* 2008). The small projects tend to all be user or locally financed while the larger cases are all government-funded (Vietnam) or government programmes (Namibia, Tanzania, Zimbabwe).

Table 2. Types of PES

Source of funding	PES case studies
Government-funded	RUPES, Sumberjaya, Indonesia. RUPES, Singkarak, Indonesia. The 5 Million Hectare Reforestation Programme (5MHP), Vietnam. Bolsa Floresta, Brazil. PSA-H, Mexico.
User-funded	Ulu Masen, Indonesia. Noel Kempff Mercado Climate Action Project (NK-CAP), Bolivia. Pimampiro, Ecuador. Nhambita Community Carbon Project, Mozambique. Ibi Batéké Carbon Sink Plantation, DRC.
Other economic incentives	Communal land wildlife conservancies, Namibia. Community-based forest management (CBFM), Tanzania. CAMPFIRE, Zimbabwe

Table 3. Geographical scale of the case studies

Geographical scale	PES case studies
<100,000 ha	RUPES, Sumberjaya, Indonesia. RUPES, Singkarak, Indonesia. Pimampiro, Ecuador. Ibi Batéké Carbon Sink Plantation, DRC. Nhambita Community Carbon Project, Mozambique.
100,000–1,000,000 ha	Ulu Masen, Indonesia. Noel Kempff Mercado Climate Action Project (NK-CAP), Bolivia. PSA-H, Mexico.
>1,000,000 ha	The 5 Million Hectare Reforestation Programme (5MHP), Vietnam. Communal land wildlife conservancies, Namibia. Community-based forest management (CBFM), Tanzania. CAMPFIRE, Zimbabwe.

2.1 Payment design features

At the very minimum, payments need to meet the opportunity costs (plus transaction costs) that resource managers incur from changing their behaviour. Equally important to the size and duration of the payments are how the price is determined, the frequency of payments, and to whom and in what form the payments are made.

The key finding from our small number of case studies is that there is considerable diversity in all aspects concerning payments features. Two programmes in Latin America – Pimampiro (Ecuador) and the PSA-H (Mexico) – pay between US$6–12 and US$27–£6 per hectare per annum respectively. In Vietnam, the government pays between US$3 and US$6.5 per hectare per annum, although this is considered to be low compared with alternative land uses (Liss 2008) and payments have recently been doubled (Pham Thu Thuy, pers. comm.) In Brazil's Bolsa Floresta, payments are made to both families (US$50/month) and to the community (US$2,500 per annum). Similarly, under the Nhambita Community Carbon Project in Mozambique, individual farmers can benefit from carbon sequestration payments, but the community as a whole also benefits from payments for avoided land-use change in an area adjacent to the Gorongosa National Park. Cash income is only one form of payment and experience suggests that alternative payment forms – such as conditional land tenure – can also be effective. The Sumberjaya site in Indonesia is one where facilitators are experimenting with securing land rights for farmers rather than direct cash payments per se. Other alternative conditional payment forms could also be explored.

CAMPFIRE in Zimbabwe and (more recently) the CBNRM programme in Namibia have considerable experience with a range of household-level incentive mechanisms. Under CAMPFIRE, direct payments to households were strongly encouraged on the basis that they created the most tangible and direct link between people and wildlife (Child 2004). However, this approach was only used in a limited number of communities. In most communities in most years, payments were made to either village or ward CAMPFIRE committees that used the revenue on behalf of the residents. Similarly in Namibia, money has been allocated by the conservancy committee on behalf of the members, although there are increasing examples of conservancies opting to allocate a portion of the revenue directly to members (Jones and Mosimane 2007).

The other important design criteria of the PES deals (i.e., the length of the contracts, the conditionality, and the determination of the payment levels) all vary considerably between the programmes/projects. The contract duration of the core PES programmes in Latin America and Southeast Asia varies between one and five years, the exception being the Noel Kempff Mercado Climate Action Project where the programme lasts for 30 years, and Pimampiro where the initial five-year contracts in 2005 were prolonged into perpetuity. The short duration of these contracts is to be expected – not just because they are innovative, but because they almost all have substantial government or donor funding and

thus depend on continuous political support. The Nhambita Community Carbon Project explicitly recognises the costs that farmers incur by compressing the total projected carbon over 100 years into payments that take place over seven years. This approach clearly benefits the farmer, but does make massive assumptions on the permanence of the changes over the following 93 years after the last payment has been made (Jindal 2008).

Although conditionality and sanctions are important design features, there is very little evidence in our case studies of them being fully applied outside of the Pimampiro Scheme, where some families were excluded from the programme due to non-compliance (Wunder and Alban 2008). Elsewhere, the use of conditionality has been deficient – either because the rules are too flexible and ad hoc, and the programme is too new (Bolsa Floresta), or because programme monitoring is inadequate, making exclusion and non-payment difficult when contract breaches are discovered (Mexico PSA-H).

2.2 Effectiveness and efficiency

For the purpose of this review, 'effectiveness' means the extent to which delivery of an ecosystem service or related environmental target has been achieved compared to an agreed baseline. 'Efficiency' refers to the costs incurred to achieve a certain target – the lower the costs, the more efficient a scheme is. Effectiveness and efficiency are important in the context of climate change since investment in REDD, particularly through caps at the international level, implies that alternative mitigation activities have been forgone.

The selected case studies from the four regions provide little insight into the effectiveness and, indeed, the efficiency of the selected initiatives. There are several important reasons for this:

- In many cases the time elapsed since the start of the initiatives is too short.
- There is insufficient baseline data (and no control area) to compare changes as a result of the project.
- There are very few analyses based on solid monitoring and evaluation methods.[5]

The absence of data against which comparisons can be made, limited human resources, and the need for changes to be made over extended periods all challenge one of the fundamental PES assumptions – that there is a 'clear and well defined service' (Wunder 2005). In many ways, the limitations of these case studies and the information available reinforce the importance of the cross-cutting issues addressed in Section 3.

5. The limited statistically verifiable assessments of the effectiveness of conservation programmes and projects has meant that investment is often guided by anecdote rather than being evidence-based (Ferraro and Pattanayak 2006).

Theoretically, under the assumption of perfect markets, the interaction of the willing buyer and willing seller for a defined ecosystem service is supposed to result in both an effective and an efficient outcome (Wunder 2005). The chances of an efficient outcome under a PES relationship are considered to be more likely than in other forms of conservation where governments and/or donors effectively set the prices (Wunder *et al.* 2008). The information available for most of the case studies is insufficient to make an assessment of the efficiency of the interventions. However, of the 13 case studies, four are government-funded initiatives in which prices are administratively determined and in many cases facilitated by government departments. There is a risk that administratively set prices ignore the opportunity costs of forest conservation (i.e., prices are either set too low as in Vietnam, or too high as in Mexico), which ultimately results in inefficiencies. An example of how efficiency may be increased is the use of procurement auctions to reveal the 'true' opportunity costs involved in a PES scheme, as already used in two PES schemes in the US and Australia (Ferraro 2008).

One review of a dozen cases of both user- and government-financed PES schemes in developing and developed countries finds from the available circumstantial evidence that user-financed schemes probably are environmentally quite efficient, but also expensive to start up. Conversely, government-run schemes tend to be less efficient, but cheaper to set up (Wunder *et al.* 2008). The challenge for REDD implementation will be to combine the best features from user- and government-financed approaches. The initiatives that are currently being tested do provide a basis from which to learn and, potentially, either scale up or replicate.

In the context of this review, there is some important evidence from the CBNRM programmes of Namibia and Zimbabwe. Both these programmes have demonstrated how their original objectives have expanded in terms of the overall development and conservation challenges that they have encountered (Frost and Bond 2008). For example, CAMPFIRE was initially conceived as a very narrow, self-funding wildlife and wild land conservation programme (Martin 1986). Similarly, in Namibia the conservancy programme has expanded to include issues such as governance, health and education (NACSO 2008). In addition, both programmes have received considerable donor support. In Zimbabwe this has been estimated at about US$35 million over 16 years, while in Namibia donor expenditure is estimated to be between US$37 million and US$46 million since 1990.[6]

PES tools are a relatively recent addition to the conservation toolbox. These brief reviews have highlighted the general absence of monitoring and critical evaluation – a problem in many conservation and development projects (Sutherland *et al*. 2004; Ferraro and Pattanayak 2006). National and sub-national REDD programmes will need to invest in effective monitoring and evaluation to be able to demonstrate that on-site impacts are additional, permanent, and have not simply displaced deforestation and forest degradation.

6. For Namibia, the return on these donor revenues has been calculated at 13 per cent (NACSO 2008).

2.3 Equity and livelihood impacts

One of the recurring concerns with payments for ecosystem services, particularly in the context of the much larger-scale payment schemes that would be required for REDD, is that indigenous and forest-dependent communities will not benefit or, worse, will suffer harm (Landell-Mills and Porras 2002; Griffiths 2008; Castro Diaz 2008). This is a critical issue because there are an estimated 60 million indigenous people and a further 400-500 million who live in, or close to, forests and depend on them for their survival (Sunderlin *et al.* 2008). Prospective areas of concern that payments for REDD might impact include:

- Weakening of land and resource rights of indigenous and forest dependent communities.
- Equity in opportunities to participate as sellers of carbon.
- Equity in payment levels and terms – vulnerable communities may be subjected to exploitative contracts.
- Local economy impacts, which through effects on food prices and employment can affect both participants and non-participants in PES.[7]

Our review of PES schemes, and of equity issues in particular (Background Paper 9), highlights useful lessons on the potential for equitable payment schemes. Importantly, there is little evidence of long-term adverse effects on equity for the four issues above. If anything, PES schemes have proved to generally yield positive impacts on poor people in the areas where they were implemented. Specifically, we have found that:

- PES schemes have not led to weakening of land tenure and in some cases have strengthened it.
- The direct evidence from our selected case studies on the impact on livelihoods is limited. In most cases evidence is absent for the same reasons that it is not possible to ascertain the effectiveness of the case studies (i.e., short time periods and limited data). In Southeast Asia, where PES mechanisms are just emerging, the approach of strengthening land rights (Sumberjaya) or enforcing traditional rights (Ulu Masen) do have potential livelihood impacts where local people's rights too often have been ignored.
- PES mechanisms have a longer history and are being more widely applied in Latin America than elsewhere (Porras *et al.* 2008). Initial assessments showed that the first generation Costa Rica national PES scheme was failing to reach poorer farmers and land users who held no formal land titles and could not afford the associated transaction costs. Subsequent iterations of the programme have developed mechanisms to specifically ensure that they are targeted to poor people and that the barriers to entry are either lowered or removed (Grieg-Gran forthcoming).

7. Grieg-Gran (forthcoming) identifies two other concerns that are beyond the scope of this paper: i) national economy impacts on growth and income levels and more indirect impacts, for example 'resource curse' effects as significant inflows of REDD revenues distort economies and lead to rent-seeking (see also Peskett *et al* 2008) and ii) participation in decision-making on REDD – indigenous people's movements have protested that they have been left out of negotiations (Castro Diaz 2008).

- Small-scale farmers with informal land tenure have been able to participate in some PES schemes, notably the national payment for watershed services scheme in Mexico. One of the measures used in Mexico (and more recently in Costa Rica) to facilitate participation of small-scale farmers and communities is 'collective contracting', where several small-scale farmers conduct the contracting process together and in this way reduce individual transaction costs. Moreover, all national-level PES schemes appear to be making concerted efforts to target poor and marginalised groups – sometimes to an extent that poses a risk to the primary environmental goals of the programmes.
- The livelihood and equity impacts of the CBNRM programmes in the miombo woodlands are ambivalent. Under CAMPFIRE, the gross benefits per household were substantial compared with alternative sources of revenue in only a few locations characterised by large areas of wild land and low human populations (Frost and Bond 2008). In Namibia, recent household surveys have shown that there are statistically significant benefits to households in the arid western conservancies, but not necessarily in the semi-arid (eastern) conservancies which fall into the miombo woodlands (Bandyopadhyay *et al.* 2008). The only substantive quantitative survey that addresses equity finds no evidence of elite capture in Namibia (Bandyopadhyay *et al.* 2004), although qualitative surveys in the northeast do highlight some challenges to community governance that could lead to elite capture (Child *et al.* 2008).
- In spite of seemingly low levels of payment, PES is popular with farmers. There is an eagerness to enter PES schemes (both Costa Rica's and Mexico's schemes are over-subscribed) and sometimes a willingness to negotiate permanent payments after a pilot, as in Pimampiro. This enthusiasm is an indication that PES schemes are perceived as advantageous by those involved.
- There is little evidence of local economy impacts on prices and employment.

The hypothesis that PES tools could lead to inequity and exacerbate poverty is not borne out by the literature review or the four regional case studies. The evidence is that some programmes have made small and modest impacts on livelihoods. Recent work on payments for watershed services also concludes that these mechanisms have not yet directly impacted on poverty reduction to any great extent, although their indirect impacts have significant potential for poverty reduction (Porras *et al.* 2008; Bond and Mayers 2009).

Photo: Biosphoto / Lorgnier Antoine / Still Pictures

‘Do not maltreat the trees!’ Under the right conditions and with the right incentives people will protect standing forests.

Cross-cutting issues related to REDD design and implementation

The enabling conditions necessary for PES to be an effective instrument for REDD are varied. PES mechanisms have been advocated largely as an independent tool that is most effective when there are strong economic externalities (Engel *et al.* 2008). The evidence from this and other reviews suggests that PES and PES-like schemes are being implemented in a wide variety of contexts where there may or may not be significant economic externalities. Clarity over land and resource rights is crucial. In those agricultural frontier settings where deforestation happens through illegal but tolerated public land grabs, PES approaches alone will not be viable.

A similar situation occurs with respect to the control of illegal logging in public and/or quasi open-access forests. In these cases, additional investments in policies and measures to improve the governance of forests will be necessary. This raises critical and as yet unanswered questions, such as whether there is the potential for REDD interventions to stimulate the resolution of key governance and other enabling conditions, or whether these challenges need to be resolved first before any investment in REDD interventions makes sense.

This section covers three groups of enabling conditions that are central to the design and implementation of national and sub-national REDD systems:

1. Costs: what methods are appropriate for estimating the costs of reducing emissions from deforestation and forest degradation?
2. Governance: what principles of good governance should be incorporated into the design and implementation of REDD and promoted within a country's broader forest governance framework?
3. Measuring emission reductions: how should baseline emissions be determined and what methods are most cost-effective for monitoring forest cover changes and associated CO_2 emissions?

3.1 Estimating the costs of REDD[8]

Different types of cost in REDD

Many widely varying estimates of the costs of implementing REDD have been produced. Estimates of the cost of reducing annual deforestation by half prepared for the Stern Review on the Economics of Climate Change (Stern 2006) ranged from US$3 billion to $15 billion, with US$5 billion per year as a central estimate (Grieg-Gran 2006). The Stern Review translated these estimates into per tonne

8. This section draws on Background Paper 7: 'Methods to estimate the costs of REDD'.

of CO2 suggesting a range from US$1 to US$5 per tonne CO_2, and argued that avoiding deforestation would be a cost-effective mitigation option. Very recently the Eliasch Review (2008), while also concluding that avoiding forest-based emissions would be cost-effective, estimates that US$17–$33 billion per year is needed to finance the halving of emissions from the forest sector up to 2030 in a global carbon trading system with average carbon prices of up to US$15 per tonne CO_2.

Part of the reason for this apparent wide range in estimates is that the studies are measuring different components of costs or framing the question in different ways, reflecting different assumptions about how REDD would be implemented and who bears the costs. The different types of cost involved in implementing REDD include:

- Opportunity costs: forgone profits from alternative land uses such as cash crops or subsistence agriculture, including revenues from timber sales.
- Transaction costs: these encompass all costs associated with the set-up and running of the scheme (government transaction costs) and the costs individual landowners have to bear in order to participate in the programme, including costs associated with changing to forest-conserving land uses (private transaction costs).
- Rents: these occur if payment is made at the price equal to the marginal cost of the last unit of avoided deforestation/degradation needed to meet the desired objective (or the price that is competitive with other emission abatement options if a fully fungible market is envisaged). This is the opportunity cost to the forest landholders plus the rents that would accrue to the non-marginal landholders if payments are made at the cost of the marginal unit of emissions abatement.

Most of the cost estimates produced to date for REDD have focused on what would be needed to pay landholders to conserve forests or reduce degradation. These estimates are based implicitly or explicitly on the view that landholders clear forests because – given the skills, finance and technology available to them – they can get a higher return from converting the forest to agriculture or ranching than they can from sustainable forest management or forest conservation. One way of changing the incentives is by paying landowners enough to compensate them for what they would have earned from the land over time if they had deforested it. The returns from alternative land uses to forest are therefore a good indicator of the minimum funding required to tackle deforestation (Grieg-Gran 2008).

The cost of paying landholders – opportunity costs

There are two main approaches for estimating costs: local-empirical and global simulation. These are sometimes referred to as 'bottom-up' and 'top-down' approaches respectively. A third approach, global-empirical, is sometimes identified (e.g., by Boucher 2008) but is really a subset of local-empirical methods. Table 4 compares the local versus global models.

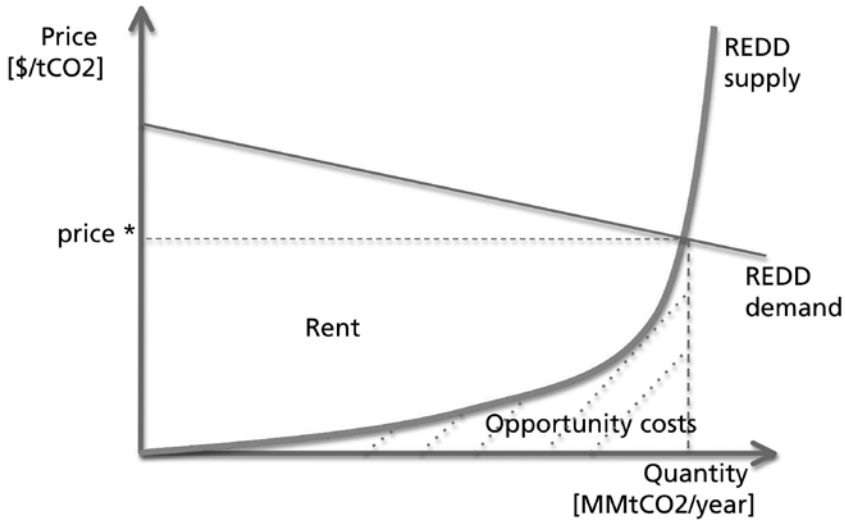
Table 4. Halving global deforestation: comparisons between bottom-up and top-down approaches

	Bottom-up analysis of eight tropical countries (Grieg-Gran in Eliasch 2008)	Top-down review of three global land-use models (Kindermann *et al.* 2008)
Costs of halving deforestation:	USD$7 billion/year.	USD$17.2-28 billion/year.
Time frame:	Immediate; and annual reductions assured over 30 years.	By 2050.
Costs included:	Opportunity costs of protecting forests; estimated administration costs of US$233–500 million/year for REDD; and estimated US$50 million one-time costs for national forest inventories in 25 countries plus US$7–17 million/year to administer them.	Opportunity cost curves are estimated, including rents (profits) earned by REDD providers in selling reductions at a single market price.
Comments:	Commodity prices fixed.	Market effects incorporated (e.g., prices rise as supply falls) which tend to raise costs.

Source: Lubowski 2008

Central to the estimation of opportunity costs in both methods is the notion of a supply curve (Figure 2). Some land uses in some locations – such as small-scale cattle ranching in Brazil – give very low returns on a per hectare basis so the opportunity costs are extremely low. Some land uses, such as oil palm, give very high returns and so would be at a different point on the curve.

Figure 2. The REDD supply curve including opportunity costs and rents



Adapted from Eliasch 2008

Local-empirical models. The local-empirical approach is based on detailed studies within a particular area. The analysis of the opportunity costs generally considers agricultural rents less the rent from any extraction of timber. The cost per tonne of CO_2 is worked out by applying a carbon density factor appropriate for that area. These studies have the advantage that they take into account location-specific factors that affect the returns to different land uses, such as proximity to markets, soil fertility, climate etc., and differences in carbon density. This means that their accuracy for the area studied is high. The disadvantage is that the area studied is often quite small. When the results from these studies are generalised to a larger area or transferred to other areas, which might have different physical and location factors, this accuracy is lost. For this reason, global-empirical estimates such as those prepared for the Stern Review, and which draw on the results of local studies, can only be approximate.

More sophisticated local-empirical studies are emerging that take greater account of spatial variation. By using methods such as geographic information systems (GIS) they capture differences in opportunity costs over a large area and differences in carbon density. Studies of this nature have been made in Brazil, Peru, Indonesia and Cameroon (Swallow *et al.* 2007).

A further drawback of local-empirical methods is that they give only a current snapshot of the situation and do not take into account future changes in population, technology and prices, as well as the market feedbacks of paying for REDD such as increased agricultural production costs (upon increased need for agricultural intensification). Opportunity costs will rise over time in response to greater land productivity induced, inter alia, by REDD policies. In addition, very few of these studies address the cost of avoiding forest degradation.

Global simulation models. The global simulation methods simulate the dynamics of the world economy to examine how various sectors that affect land use and energy and carbon prices interact.[9] The sectors are primarily forestry and agriculture but energy is addressed in less detail insofar as it affects carbon prices. As the models include only a few sectors they are called partial equilibrium models.

The basic approach is to examine how activities in these sectors change in response to carbon prices, and with comparison to a baseline scenario. The models estimate future deforestation CO_2 emissions over a given period in the absence of REDD, making assumptions about population and economic changes. They then examine the effect of introducing a carbon price for avoided deforestation at different levels. The model simulates the effect of the carbon price at different levels on the relative returns from forestry and agriculture and hence the area of land that is deforested or afforested. This produces a marginal abatement cost curve for carbon from avoiding deforestation and degradation.

9. Most of these models pre-date the current global economic crisis and we assume that the most recent price dynamics have not been built in.

Developers of the three main models collaborated to compare their models (Kindermann *et al.* 2008), estimating that the average annual costs for halving global forest emissions range from US$17 to US$28 billion.

Models of this type were employed in the IPCC Fourth Assessment Report (IPCC 2007) and in the Eliasch Review (2008), which estimated the average annual cost of purchasing credits representing half of global forest abatement potential to 2030 as US$22 billion per year (IIASA cluster model[10]) and US$33 billion per year (The Generalized Comprehensive Mitigation Assessment Process Model or GCOMAP).

The strength of these models is their ability to take account of in-sector and cross-sector interactions (Sohngen 2008; Kindermann *et al.* 2008). Weaknesses of these models include simplifying assumptions about potential rents from agriculture and livestock in tropical forestlands (Nepstad *et al.* 2007), and the exclusion of transaction costs and other institutional barriers raising the costs in practice (Kindermann *et al.* 2008).

There is a marked difference in cost between the various estimates, and in particular between the local-empirical and the global simulation approaches. The local-empirical costs (and the global estimates derived from them) are considerably lower than in the global simulation models. In part this is because the global simulation approaches, as pointed out in the Eliasch Review (2008), include the rents as well as the opportunity costs.

Nevertheless, there are still significant differences in the marginal cost of CO_2 abatement between the various global models and between the global models and the local-empirical estimates. In the two global models used in the Eliasch Review, the carbon prices that would halve forest emissions are US$11 and US$15 respectively. In comparison, Börner and Wunder (2008), in a local-empirical study in two states in Brazil, estimate a 'choke price' (that would prevent all deforestation) at US$12.34 in Mato Grosso and US$3.24 in Amazonas. Another study of the whole Brazilian Amazon (Nepstad *et al.* 2007) produces much lower costs still, finding that 90 per cent of the forest emissions can be abated for less than US$1.4/t CO_2 (US$5/t C).

Reasons for this divergence include differences in carbon density factors used in the studies, the extent to which emissions from degradation are covered, and other simplifying assumptions. For example, one implicit (yet strong) assumption is that of 'perfect targeting', i.e., that one can perfectly identify those that plan to cut down trees and only pay them. This is likely to play out much differently in reality. For these reasons, costs in reality will likely lie somewhere between the estimates of the local studies and the global simulation models.

10. International Institute for Applied Systems Analysis (IIASA) Global Cluster Model combines geographically explicit biophysical models with economic modelling (Gusti *et al.* 2008).

Transaction costs

Transaction costs refer to the costs of the various activities needed to make an economic exchange and arise at two levels: i) start-up costs and ii) recurrent costs. Important categories include up-front elements such as scheme design and negotiation, and recurrent elements such as monitoring, enforcement and protection, and verification and certification (Pagiola and Bosquet, 2009; Milne 1999). Some of these are borne by the buyers and sellers, while some are incurred by the authorities implementing a scheme.

Information on the transaction costs of REDD schemes remains limited. Scattered information is primarily available from experience with PES schemes in Latin America and from CDM forestry projects. While this data varies in the categories of transaction cost included, it provides support for the conclusion that start-up transaction costs are high but that there are economies of scale. Small projects or schemes are at a disadvantage because of the high fixed-cost element in transaction costs.

This data also shows that in terms of costs per tonne of CO_2, transaction costs add very little to the costs on average. But transaction costs can vary substantially across governance contexts. Realising REDD projects or schemes in weak governance settings is likely to imply higher transaction costs (both up-front and recurrent) than in settings where institutions and rights are well defined and well functioning. The Eliasch Review (2008) has provided some indication of the additional costs to get countries prepared to participate in an international REDD trading scheme. It has estimated that US$50 million will be needed for a sample of 25 forest nations to set up robust national forest inventories – with a further US$7–US$17 million needed for annual running costs. Capacity-building to prepare for participation in forest market schemes in 40 forest nations could cost up to US$4 billion over five years.

3.2 Improving forest governance and REDD[11]

Failures of governance often underlie deforestation and forest degradation

The successful implementation of an international REDD scheme depends upon the will and ability of states to govern their forests effectively. There is a well-established consensus that failures of governance are underlying causes of deforestation and forest degradation, for example:

- Government policies often promote forest conversion for agriculture, settlement, or other land uses that lead to environmental degradation while contributing little to economic growth and poverty reduction.
- Governments do not effectively regulate the forest industry. Forestry concessions often go to the privileged elite, and corruption can be widespread. At the

11. This section draws on Background Paper 8: 'National and international legal frameworks for REDD mechanisms and their relationships with multilateral environmental agreements (MEAs)' and Background Paper 10: 'The role of governance in land-use and forest management'.

same time, forest laws, regulations and procedures are often ambiguous and overlapping, and are characterised by a lack of transparency and weak enforcement and accountability; in addition efforts to decentralise authority are often incomplete (Kanninen *et al.* 2007; Larson and Ribot 2007).

- Traditional forest users lack secure property rights. Without secure tenure, these users lack the basis for sustainable management (Kanninen *et al.* 2007).
- When communities hold common or customary rights to forests, local institutions often lack capacity to specify clear rights and responsibilities for managing forests as well as an ability to mediate disputes (Ostrom, cited in Kanninen *et al.* 2007). Rather than recognising common ownership, countries often provide individual titles or titles to a small part of communal territories. Because some indigenous people lack legal recognition as citizens, communities or peoples, they face additional barriers in obtaining rights to their land (White *et al.* 2008).
- Disputes often result from discrepancies between customary and statutory land governance systems. In mid-2008, 71 violent conflicts over allocation of natural resources were recorded worldwide, around two-thirds of which were driven by contested land rights claims. Many of the conflicts occur in forests. 'Between 1990 and 2004, armed conflicts took place in almost 9 per cent of the world's dense, mainly tropical, forest; in Africa, over one-half of the continent's forests and 52 million people were affected' (White *et al.* 2008).

Risks to REDD from failing to address governance

Conflict over who owns the forests and the value of forests complicates the process of making effective, efficient, and fair decisions about forest management and use. While it has the potential to improve forest governance, planning and implementation of REDD could fail to reduce forest emissions and even create perverse incentives to increase emissions and threaten the rights and livelihoods of forest-dependent communities if governance issues are not addressed. It has been suggested that large financial flows under a national REDD programme could fuel conflict and create new opportunities for forest sector corruption. At the same time, the new value of forest lands for carbon storage could encourage governments and commercial interests to actively deny – or passively ignore – the rights of indigenous and forest-dependent communities to access and exert control over forest resources (Brown *et al.* 2008).

A recent review on the links between REDD and poverty found the implications of REDD proposals for the poor fall into three categories: 1) REDD could provide new benefits to the poor such as increased income or improved local environmental assets; 2) it could do no harm, but offer no new benefits (if there is no investment in areas or activities that relate to the poor); and 3) it could threaten the poor through elite capture of the benefits, lost access to environmental assets, and/or lack of voice in REDD decision-making (Peskett *et al.* 2008). Without clear land and carbon rights, the local co-benefits that could help ensure the permanence of forest emission reductions are unlikely to be realised.

Case studies in the three developing countries with the largest tropical forest areas – the Democratic Republic of Congo, Indonesia and Brazil – illustrate how legal and institutional framework conditions differ widely in terms of existing law, its implementation, and its adequacy to govern the complex arrangements required to put REDD mechanisms into operation (Box 2). Overall, the readiness of the different jurisdictions in each country to provide a working framework for land management, equitable payment arrangements and environmental protection issues related to REDD is weak.

Box 2. Case studies of national legal frameworks – DRC, Indonesia and Brazil

The Democratic Republic of Congo (DRC), Indonesia, and Brazil all have basic laws in place regarding forest conservation, land use, and how concessions are granted. In practice, however, there is considerable variance in the quality, harmonisation and effectiveness of these laws. In federal systems such as DRC and Brazil, the situation is complicated by different and sometimes conflicting layers of law. While there are still large gaps in the law of the DRC, there is already a relatively comprehensive set of nature conservation and forestry legislation in Brazil that could provide an entry point for REDD.

Brazil has an operational framework for licensing and forest management systems. Both Brazil and Indonesia have previous experience and expertise with certification systems. However, uncertainties about land ownership and tenure rights remain a common problem, and the relationship between customary titles to land and modern state law is problematic in all three jurisdictions. While a system of legal safeguards to protect the interests of indigenous peoples is emerging in Brazil, the status of indigenous communities is much weaker in Indonesia and virtually non-existent in the DRC.

The implementation of existing rules and regulations also differs tremendously. Brazil mainly faces an enforcement problem. In Indonesia, on the other hand, awareness of and compliance with the law is not only weak among the general public but also among government officials. In the DRC, there is often no operational framework of law that could be enforced. The lack of government capacity, government accountability, and effective judicial systems are further impediments to an international system that aims to attract investors and channel the flow of funds.

Strengthening forest governance at national and sub-national levels

At national and sub-national levels, a REDD mechanism will need to integrate with and/or encourage forest governance reform processes that aim to clarify and secure the rights of forest-dependent communities, facilitate the equitable sharing of benefits, and promote sustainable forest management. This review highlights five key elements of an enabling policy and institutional framework for planning and implementing REDD at national and sub-national levels:

1. Multi-stakeholder dialogue to design national and local policy and institutions to implement REDD.

2. Integration of REDD into national development policy and planning processes.

3. Reform of national forest policy, legal and regulatory frameworks.

4. Independent monitoring of carbon and governance.

5. Procedural rights of public access to information, participation, and justice.

Multi-stakeholder dialogue on REDD

Multi-stakeholder dialogue is widely proposed as the foundation for planning and implementation of REDD, for example through establishment of a multi-stakeholder national REDD working group. The Eliasch Review points to experience with multi-stakeholder dialogue processes under the National Forest Programme (NFP) approach and the European Union's Forest Law Enforcement, Governance and Trade Programme (FLEGT) as 'good models that can contribute to higher levels of trust between governments, the private sector, NGOs and community groups' (Eliasch 2008).

The FAO's National Forest Programme Facility (NFPF) supports participatory processes in NFP partner countries by providing grants for training stakeholders in developing policy and strategy at different geographical and administrative levels, and in developing and adopting new legislation or mechanisms including payments for environmental services and decentralisation initiatives. The European Union, which adopted a FLEGT Action Plan in 2003 to address illegal logging, has experience with stakeholder approaches through voluntary partnership agreements (VPAs). The EU Commission has published guidelines for stakeholder consultation in the VPA process (Saunders *et al.* 2008). Ghana and the EU signed the first agreement in September 2008; local NGOs participated through an effective coalition and helped keep forest governance issues on the table (Global Witness 2008).

Integration of REDD into national development planning

A major challenge in establishing a national REDD mechanism is linking REDD to wider national development policy and planning processes. This is important in order to align REDD with broader national development goals and priorities, and because the main drivers of deforestation mostly lie outside the forest sector.

One priority is building links with national poverty reduction strategies and programmes. A 2005 review of 27 poverty reduction strategy papers found forestry mentioned in 23 of them, but the references were brief and general (Peskett *et al.* 2008). A national REDD mechanism will need to engage with planning and key sectoral ministries if REDD is to reach the poor. FAO's NFPF has gained extensive experience working with countries on implementing a more programmatic and cross-sectoral approach to forest and land-use management policy, planning and investment.

Reform of forest policy, legal and regulatory frameworks

Policy and legislative reform to improve land-use and forest management covers a broad range of issues within and outside the forest sector, with land tenure and resource access and control at the heart of the discussion. Background work for the

Eliasch Review lists the following key areas of intervention related to planning and implementation of REDD:

- Formulation of a national REDD strategy.
- Land reform including tenure reform, zoning, and support for payments, forest certification and community forestry.
- Legal reform to encourage sustainable forest management, removal of subsidies, tax incentives, and equitable revenue distribution.
- Institutional reform including clarification of roles, capacity-building, and improved transparency.
- Enforcement, including building NGO capacity and an independent judicial system.

In determining how payments flow from the international level to local land users, the REDD mechanism's structure must be capable of interacting with a variety of domestic legal orders. A robust legal and institutional framework is essential to ensure investor confidence, credible certification, and fair remuneration for ecosystem services. In establishing the right balance between land management, forest conservation and market mechanisms to make REDD work, legal certainty and the rule of law are important elements.

Independent monitoring

While monitoring forest carbon is a basic element in implementing REDD, there is also a need for independent monitoring of forest governance reform processes and outcomes. The Rights and Resources Initiative, for example, proposes establishing 'transparent and independent monitoring systems for monitoring the status of forests, forest carbon, and impacts on rights and livelihoods', including investments to:

- Establish credible maps and inventories of statutory and customary forest community tenure rights.
- Monitor the status of compensation, distribution of benefits, impacts on rights and conflict, and compliance with the 'free, prior and informed consent' standard.
- Monitor the impact of forest-related climate change responses on the rights and livelihoods of forest peoples, including locally based verification (Rights and Resources Initiative/Rainforest Foundation Norway 2008).

The Eliasch Review stresses the importance of a 'transparent publication system for all forest carbon finance transfers, within and beyond a country's borders.' It notes that a World Bank study found that independent forest monitors in the Cameroon 'had enhanced law enforcement, created significant pressure for greater public information and spurred reforms that have increased government revenue collection' (Eliasch 2008). Global Witness spells out as a minimum requirement for REDD that countries establish a mechanism similar to the Extractive Industries Transparency Initiative to 'ensure transparency, independent oversight and public accountability in the distribution of REDD revenues' (Global Witness 2008).

Establish and/or strengthen procedural rights

It is procedural rights that allow citizens to participate in REDD planning and implementation and to hold governments accountable for their actions. Extractive sectors such as forestry tend to lag behind others in practising procedural rights (Foti *et al.* 2008). According to Seymour, in the forest arena 'there is a strong risk that procedural rights in the formulation and implementation of national climate policies related to forests will not be adequately respected. Significant donor investment in capacity of governments will need to be broadened to include capacity for inclusive decision-making and meaningful participation by less powerful groups. This suggests that REDD interventions will need to be paced and sequenced in accordance with capacity-building achievements, and thus the level of urgency for the latter is high' (Seymour 2008). Priority areas for strengthening procedural rights include:

- **Access to information**. Procedural rights relate to all stages of the information cycle from collecting and managing information to analysing, disseminating and using it. They include both participation in the process and access to the results. For REDD, this includes providing information about how REDD works and what it might mean for communities, as well as information on bargaining with possible investors or funders (Peskett *et al.* 2008). The forest sector can learn from initiatives such as the Extractive Industries Transparency Initiative, Publish What You Pay and The Access Initiative. Forest agencies as well as communities and civil society can support public access to information on land and forest classifications, ownership and access rights, and permitting, licensing and concession systems as well as freedom of information acts (White *et al.* 2008).

- **Participation in decision-making**. Indigenous peoples and forest communities did not participate in early REDD conversations. As they have become more active, they are calling for better participation. The Accra Statement of Principles and Processes states that 'Indigenous Peoples and local communities must be involved at all stages of decision-making about REDD, from design to implementation' (Accra Caucus 2008). This includes national governments adopting as standard practice the growing norm that gives communities the right to 'free, prior and informed consent' (FPIC) on REDD projects affecting their community. They can build on practices developed in the infrastructure and mining sectors (Brown *et al.* 2008; Colchester 2008). Based on experience with FPIC in other sectors and in early REDD projects, an indigenous peoples meeting in November 2008 made several recommendations:
  - Fully respect the right of indigenous peoples to give or withhold their consent to REDD policies or proposals that may affect their rights, lands and resources or their interests in general.
  - Develop community-formulated protocols and standards for FPIC before engaging in consultation and consent processes.
  - Establish legal frameworks and mechanisms for FPIC and prior consultation before negotiating any REDD programme or agreement (Griffiths 2008).

A robust system of checks and balances through, for example, an independent watchdog or complaint procedure may be necessary to ensure that community and minority views are integrated into final decisions. Such a process would require substantial financial and technical support.

- **Access to redress**. In practice, forest peoples often lack access to justice and protection under the rule of law. The result is that they 'are too often forced into extra-legal means of surviving and asserting their rights, leading to conflict, repression and further abuse...Governments can legitimise and finance community mapping and related social processes for negotiating and identifying local rights of ownership, access, management, and use in forest areas. Effective ways be should found to reconcile agrarian reform, titling, adjudication, and the allocation of land for resource extraction with the effective recognition of forest tenure' (White *et al.* 2008).

3.3 Estimating emission reductions[12]

Political and technical issues in measurement

The implementation of policies to achieve REDD requires accurate estimates of emission reductions at the national scale. These emission reductions need to be additional (i.e. they would not have happened without the REDD policies) and permanent, and should not lead to increases in forest-related emissions elsewhere (leakage). Reliable data are needed to secure investor confidence, especially if they are connected to international carbon markets.

Estimating emission reductions has three essential elements:

1. **Establishing the baseline** (or 'business as usual' scenario) – how high would emissions be in the future in the absence of a REDD policy?
2. **Establishing the crediting line** (or reference scenario) – what quantity of the emission reductions will be remunerated?
3. **Monitoring** actual rates of deforestation and degradation and associated emissions over time.

It is through comparison of actual monitored emissions with the baseline or the crediting line that the emission reductions are estimated and additionality is established. In most cases the baseline and crediting line are the same, but they are related to different aspects – one to the 'business as usual' situation, the other to the reference used as the basis for crediting (for a review on reference levels, see Angelsen 2008b). Monitoring is primarily a technical issue, although there are choices to make about what to measure that raise political and equity issues. The determination of baselines (particularly at national level) raises political issues for several main reasons:

12. This section draws on Background Paper 5: 'Cost-effective methods for monitoring forest cover changes and associated CO_2 emissions for REDD' and Background Paper 6: 'The challenge and importance of baselines for REDD'.

- As the emission reduction is calculated by comparing actual monitored emissions with the baseline, this can create an incentive to inflate the baseline and corresponding crediting line.
- Future emissions from deforestation and forest degradation depend on a variety of factors including policies that governments adopt in the forest sector and in other sectors, for example promotion of agriculture and road-building.
- Historically low rates of deforestation may reflect government's efforts to conserve forests – so-called 'early actions' (e.g., Costa Rica, India) – or other country circumstances, such as when a country is still in an early stage of the forest transition curve (e.g., Democratic Republic of the Congo).
- Factors outside national government control such as changes in international commodity markets that can affect deforestation and degradation.

However rigorous the technical methods for estimating the emissions baseline, they will always have to be negotiated (Angelsen 2008b). This leads some in the international REDD debates to question whether establishing accurate baselines at the national level is even feasible (Karsenty 2008).

Technical aspects of determining baselines

A key technical issue is whether baseline scenarios should be based upon historical emissions data only or should also include projections of expected future deforestation and forest degradation rates.

Retrospective methods

Retrospective methods base their projections on (extrapolated) trends from the past, in which the baseline is determined by assessing a past reference period and calculating the mean relative rate of deforestation (Huettner 2007). The historical rate of deforestation is generally extrapolated to the forest area, starting at the commitment period, which provides the basis for estimating corresponding carbon stock changes.

Countries with low historic rates, either for reasons of policy (e.g., India) or commercial marginality (e.g., DRC) would tend to lose out with approaches based on historic rates of deforestation and degradation, while countries with high deforestation rates (quite possibly because of poor forest governance) would be rewarded. Similar considerations apply at sub-national level, for example between the Brazilian states of Mato Grosso and Amazonas, each of which currently experiences very different deforestation trends and rates.

Prospective methods

An alternative to historic baseline and credit approaches is to use prospective methods, which predict future deforestation and degradation based on models that incorporate assumptions about future developments in the forest sector and other sectors of the economy. However, this approach raises questions about which factors to include in such models and whether they can be reliably predicted. Karsenty, for example, points to the high variability of deforestation rates in Brazil

to argue that baseline scenarios are 'more likely to resemble random scenarios than anything else' (Karsenty 2008).

Hybrid approaches

Hybrid baseline-setting approaches have been suggested in proposals from Papua New Guinea on behalf of the Coalition for Rainforest Nations, the COMIFAC[13] countries, and some Latin American countries. These combine a historical approach with a development adjustment factor, in the case of Latin America, taking past efforts into account. The development adjustment factor is ultimately subjective and opens up the possibility of creating 'hot air' credits. Recently, the Terrestrial Carbon Group has proposed a 'stock-based' approach to determining emission allowances that it claims can resolve issues of additionality and perverse incentives, but which also seems to leave scope for the inflation of emissions baselines (Box 3). More importantly, a major risk of such stock-based approaches is that large payments could be made to forest areas that are not under threat, thus diluting the funds available for forest under threat and yielding low additionality (Angelsen and Wertz-Kanounnikoff 2008).

Whether historic rates are used as the sole basis for determining baselines or as an input to a more prospective approach, another important consideration is the agreed timeframe since the choice of period can have a significant effect on the baseline calculation.

Box 3. The Terrestrial Carbon Group proposal (2008)

The proposal of the Terrestrial Carbon Group seeks to separate the political issue of determining the emissions crediting line from the more technical issue of determining the 'business as usual' baseline scenario. It divides terrestrial carbon into two categories:

- Protected terrestrial carbon: 1) as at 6th December 2005 was either subject to international, national or sub-national laws or policies that effectively prevent its release (not including terrestrial carbon threatened by illegal activity); or 2) at the date the nation joins the system is inaccessible because of biophysical or economic constraints and will – with a reasonable degree of certainty – remain so for the next 50 years (according to agreed international standards).
- Unprotected terrestrial carbon: all other existing terrestrial carbon at the date the nation joins the system.

Each country is allowed to emit an agreed volume of the original unprotected terrestrial carbon each year. This agreed annual volume is the total unprotected terrestrial carbon estimated in a 'business as usual' scenario divided by the number of years covered by this scenario. The 'business as usual' scenarios and the reference period that they cover are set on a country-by-country basis. If the nation emits less than its annual terrestrial carbon budget in a year, it can sell the difference as terrestrial carbon credits but must add that volume to its protected category of terrestrial carbon to ensure permanence. If the nation emits more than its annual carbon budget in a year it cannot participate in the system again until it reverses the excess emissions.

13. The Central African Forest Commission (COMIFAC) is the primary authority for decision-making and coordination of sub-regional actions and initiatives pertaining to the conservation and sustainable management of the Congo Basin forests

Methods to monitor forest emissions

Emissions from deforestation and forest degradation can be estimated using two important variables: 1) the areal extent of deforestation and degradation; and 2) carbon stock densities per area. Remote sensing technologies combined with ground measures can play a key role in monitoring these variables.

Estimating the area extent of deforestation and degradation

Current remote sensing technology can adequately measure tropical deforestation; it is less useful for assessing forest degradation and forest carbon densities (assessments of which thus rely mainly on ground measurements). To increase cost-effectiveness, sampling and stratification techniques have been developed for both remote sensing and ground-based monitoring. The two most common approaches in remote sensing are wall-to-wall mapping (where the entire country or forest area is monitored) and sampling. Both approaches can be used in combination. Medium-resolution data can be used over a large area to identify deforestation hotspots requiring more detailed analysis that can be carried out using sampling techniques. Data resolution is a decisive factor, and a trade-off exists between data resolution (and thus accuracy) and costs. Fine-resolution data is costly and therefore prohibitive for many developing countries. At the same time medium- and coarse-resolution data are increasingly becoming available at low or no cost.

Monitoring forest degradation is more challenging than mapping deforestation, requiring ground-based measurements in addition to remote sensing. This is because degraded forests are a complex mix of land cover types (vegetation, dead trees, soil and shade). Remote sensing-based methods work best when there are detectable gaps in the forest canopy.

Estimating forest carbon stock densities

Current approaches to estimating forest carbon stock densities in tropical countries include:

- Biome averages available in look-up tables of reference carbon stock values and based on tree harvest measurement data and forest inventory data.
- Ground-based forest inventory data, which use allometric equations to convert field survey data of diameter at breast height to forest carbon stock densities.
- Remote sensing measurements.

Ground-based measurement of carbon tends to be costly and is therefore most cost-effective for project-level assessment or for sample sites. Substantial refinements are needed to remote sensing techniques before routine assessments can be made at national scales (DeFries *et al* 2007). In the future when radar and LiDAR imagery (sensors based on laser light) become widely operational, remote sensing will become particularly useful.

For the moment, current REDD measurements tend to combine high quality remotely sensed aerial estimates for deforestation and degradation with generalised

carbon density numbers obtained from look-up tables and the literature (Gibbs *et al.* 2007). Such a combination of data with unequal certainties would jeopardise all the effort required to put in place accurate monitoring of gross deforestation, as the certainty of the final estimate will only be as good as the 'least best' uncertainty value. Thus substantial effort will need to be invested in the production of consistent carbon estimates for different forests types and forest uses.

Estimating forest emissions

There are two fundamentally different, but equally valid, approaches to estimating emissions from deforestation or forest degradation: the stock-difference approach and the gain-loss approach. In the first, the difference in forest carbon stocks between two time periods is estimated. In the latter, the fluxes – emissions and sequestrations – are measured directly to estimate net emissions. This is the preferred approach and likely objective in the long run. However, due to methodological constraints, the stock-difference approach is more applicable in the immediate future.

4

Concluding observations and recommendations

In many important aspects, this joint review and analysis by CIFOR, IIED and WRI supports the goals and strategic directions of Norway's International Climate and Forest Initiative.

The brief nature of this literature review, the small sample size of 13 PES and PES-like cases, and the limited scale at which most have operated, calls for some caution in extrapolating lessons for REDD. With these limitations in mind, this section outlines broad conclusions from the review and some recommendations for the N-CFI.

4.1 Can PES be an effective instrument for REDD?

Due to the short history of PES programmes, insufficient attention to monitoring and evaluation, and the complex nature of some ecosystem services, there is still limited evidence upon which to fully assess the effectiveness of both the PES and CBNRM approaches that have been reviewed. This is also the conclusion of larger, more structured reviews of PES schemes for watershed protection – a particularly complex environmental service (Porras et al. 2008). Region-specific variants and innovations are emerging – for example in Southeast Asia where payments in the form of conditional land tenure have shown promising results. In Africa, where institutional and governance shortcomings present major challenges to PES, a more integrated approach such as CBNRM seems more promising.

Perhaps the most innovative and promising feature of PES is conditionality – that is, payments will only be delivered on a quid pro quo basis. The review of PES projects and literature strongly endorses that REDD projects and programmes need to be performance-based to be cost-effective. It is the contingent element of PES that differentiates it from other incentive mechanisms. At the same time, conditionality requires supportive policy and legal frameworks, and both effective monitoring and consistent sanctioning of non-compliance, which in practice many PES or PES-like schemes have struggled to achieve. Even where non-compliance can technically be easily detected, sometimes implementers lack the will to stop paying non-compliers due to the political costs. Conditionality may be higher in user-financed than in government-run schemes, although there is limited evidence. Payments for REDD should be conditional, but will require a considerable investment in monitoring, verification and reporting well beyond that which exists for current user-funded or government-funded schemes.

Recommendation:

Performance payments, whether market- or fund-based, will be an important element of national and sub-national REDD mechanisms. However, if certain up-

front conditions are not met, it is unlikely that PES will be an effective instrument for REDD. These up-front conditions include economic, institutional, informational and cultural conditions (Wunder 2008a). In these cases, investments in improved governance structures or other enabling policies and measures are more effective. The N-CFI, in collaboration with UN-REDD and the FCPF, could develop an operational framework of minimum conditions for PES in the form of a toolkit (with indicators) as means to assess whether PES-type performance payments are likely to be effective or what alternative investments would be needed.

4.2 Can payments for REDD also improve equity and livelihoods?

There is little evidence from the PES schemes reviewed in this report of adverse effects on equity, and some schemes have made concerted efforts to target poor and marginalised groups. However, these programmes are generally operating at a small scale. If and when REDD payments are implemented at much larger spatial scales and/or where governance is weak, facilitators and brokers will have to guard against elite and rent capture. In addition, more attention will have to be given to strengthening land tenure of local communities. REDD projects would need to incorporate specific activities to assess the strength of local property rights and to implement measures to strengthen tenure (Cotula and Mayers 2009).

The level of livelihood benefits to individual service-providing households and communities from PES and CBNRM approaches tends to constitute a small, but generally positive, contribution to total household income. Non-income benefits also tend to accrue to PES-enrolled service providers in terms of strengthened land rights, improved internal organisation, and increased visibility and negotiating capacity vis-à-vis external stakeholders. However, in some cases (e.g., NK-CAP), large-scale PES set-aside conservation efforts can depress local income generation, which may hurt the non-participating rural poor (e.g., landless labourers, charcoal-makers, fuel-wood gatherers).

Recommendation:

The N-CFI should closely monitor pilot initiatives, including the socio-economic impacts on poor households that are both directly and indirectly affected by REDD activities. Through rigorous monitoring and assessment of poverty effects, and building on recent and emerging work on REDD and the poor, the N-CFI and partner countries can tailor REDD strategies to better respond to country-specific conditions and needs.

Up-front clarity about strategies and country needs can help to identify and address potential trade-offs between cost-effectiveness and equity/livelihood concerns. For example, in cases where poverty is less pervasive and there is a narrower focus on the environmental objective of reducing emissions (e.g., at the Brazilian Amazon frontier), a 'no-harm' strategy (where undesired side-effects on the poor are mitigated) may be more cost-effective. On the other hand, in areas where rural

poverty is pervasive and contributes to forest emissions, a more 'pro-poor' strategy (where participation of the poor is actively pursued) will be more effective.

4.3 What are the costs of reducing forest emissions?

Opportunity costs for landholders are an important component of the total cost of implementing a PES-type REDD scheme. There is much variation in cost estimates, but there is a general agreement that paying landholders to conserve forests is likely to be a cost-effective greenhouse gas mitigation option – although overall costs are likely higher than suggested by the Stern Review. For an indication of total costs of REDD as a climate change mitigation option compared to alternatives, the use of global simulation models seems adequate. Local models are useful complements to global estimates, in particular for capturing sub-national or sub-regional variations in opportunity costs.

Cost levels will depend on the extent of emissions abatement sought and the design of the payment scheme. Marginal opportunity costs increase with the degree of emissions abatement (or the extent of avoided deforestation and degradation). Large emissions reductions are possible at relatively low cost, but as deforestation and degradation are tackled in areas with high-return land uses, the opportunity costs increase sharply. In terms of design, a differentiated payments scheme whereby each landowner receives just his/her opportunity costs will reduce costs considerably compared to one with uniform payments. Cost-benefit analyses of alternative payment schemes (including procurement auctions used to reveal 'true' opportunity costs) are needed, as well as more testing in pilot schemes and more rigorous evaluation.

Transaction costs are also an important component of a PES-type REDD scheme, especially during start-up, but more systematic transaction cost assessments are needed to better inform payment design.

Recommendation:

To support the design of more cost-effective PES-type REDD schemes, it is recommended to experiment with procurement auctions and similar methods that aim to more fully reveal opportunity cost information. This is in line with current PES literature. In addition, information is needed on the level of transaction costs associated with alternative payment approaches in order to assess the overall costs of a REDD action. The N-CFI could thus survey the transaction costs arising at different stages of establishing and implementing PES-type REDD schemes and develop guidelines on how to keep these costs to a minimum. This could be similar to the three-tier approach used by the IPCC Guidelines for land-use and forestry projects, where alternative methods are proposed depending on existing resources and capacity.

4.4 What is the role of forest governance?

A PES performance-based approach to REDD requires effective and equitable governance frameworks and systems, such as clarity of land rights and functioning monitoring to enable the enforcement of conditionality and quid pro quo payments. However, many areas where deforestation and degradation are highest are also those where governance is weakest. Even in countries with stronger national governance systems (e.g., Brazil), local governance systems in specific parts of the country may be weak (e.g., the Brazilian Amazon frontier). Key factors include:

- Lenient enforcement of existing forest laws and regulations.
- Incompatibilities between land-use and forest laws.
- Forest rules that favour large-scale commercial interests over local interests.
- Corruption and patronage facilitating illegal activities (e.g., illegal logging).
- Unclear or overridden local rights of ownership and access to resources.
- Onerous or absent procedures for communities to secure rights.
- Weak institutional accountability.

An international agreement on REDD will need to be supported by a participatory national process that integrates overarching principles for sound and equitable forest governance into the domestic legal order. In addition, strong sub-national legal and policy frameworks that clarify proprietorship over land, natural resources, and the benefits that are derived from these resources – and that protect the rights and interests of indigenous and other forest-dependent communities – are an essential prerequisite to effective REDD mechanisms.

Recommendation:

Strengthening forest governance will require strong and fair rules, rights, and institutions at all administrative levels – national to local – as well as civil society participation. It would be naïve to believe that this is an easy undertaking. Weak forest governance suits those who benefit from it and changing the *status quo* will be difficult. The N-CFI could assess the minimum governance conditions needed for REDD action to function effectively, taking into account different country contexts. A common framework for assessing governance of forests in relation to REDD could help to identify gaps and problems as well as verify improvements.[14] It is important that any framework be comprehensive while also narrow enough to capture the most important issues from the perspective of REDD, and could be used to help satisfy buyer's standards for 'good' emission reduction activities or to review a country's readiness to participate in REDD. The framework could become guidelines on the type of investments feasible in alternative governance contexts that would be highly useful and beneficial for future REDD investments.

14. Such a framework is currently under development by WRI and partners with support from the Government of Norway.

4.5 How will reductions in forest emissions be measured?

Methods for measuring and monitoring deforestation and forest degradation exist, and remaining technical challenges are likely to be overcome in the near future. Remote sensing plays an important role in deforestation monitoring, while ground measurement plays an important role in degradation monitoring and validation of remote sensing image interpretation. However, limited data availability (notably historical data) and capacity shortcomings present key challenges to objective and accurate monitoring in many developing countries.

The establishment of baselines or 'reference levels' is both a technical and a political issue. Technical challenges include the scale of reference levels and the availability of historical data, especially for forest degradation. Political challenges refer to the decision on the time period or time point to be used to estimate reference levels and the establishment of crediting lines (which are different from 'business as usual' baselines). Transparent baseline rules are needed. The more universal the rules, the more transaction costs can be reduced. Our review of PES cases revealed that baseline studies were mostly cursory or even completely absent. While the use of such 'implicit baselines' (where a continuation of the 'business as usual' scenario is assumed) may work in the context of PES, this is very unlikely to work for REDD.

Recommendation:

Key constraints to monitoring in many developing countries – especially for the purpose of REDD – are access to data at a reasonable cost, and the technical infrastructure and capacity for consistent, transparent data analysis and management. Providing access to free or low-cost fine-resolution imagery is key, as is support to countries to set up national REDD monitoring infrastructures, including training of technicians. Regional partnerships for acquiring and developing appropriate methods, or sharing experiences from Annex I countries on their approaches to monitoring, verifying and reporting changes in forest carbon stocks, could be further avenues to develop capacity and reduce costs.

Participatory ground-based monitoring via well-constructed and appropriate methods (for example, management-oriented monitoring systems in Namibia) are cost-effective and can also be used to build proprietorship over land and natural resources, an additional governance co-benefit.

Investment to improve the current knowledge of forest carbon stocks in tropical forests is needed – including in forest-use systems (e.g., agroforestry) or affected forest ecosystems (e.g., degraded forests). Particularly promising are LiDAR sensors, but satellite imagery will only become available after 2015[15]. There is thus a need to make maximum use of currently available alternatives (ground-based measurements, GIS models to extrapolate sample data, etc.) including the

15. Widespread LiDAR imagery will only become available from 2015

establishment of allometric relationships for alternative forest types and uses. Consideration should be given to establishing an independent international forest carbon monitoring institution. Such an independent institution could help to ensure reliable, unbiased monitoring at the national level and help to overcome capacity shortcomings. Leaving the monitoring task to each supplier country may create incentives for biased monitoring to reap carbon benefits. Centralising this task at global level can further benefit from economies of scale and render monitoring far more cost-effective than ensuring coherent monitoring by each country, and will provide more coherent time-series of deforestation data for baseline purposes.

4.6 Learning lessons for REDD

We believe that the N-FCI is uniquely placed to catalyse a culture of learning and sharing among all the stakeholders who are involved with REDD. At the country level, this could entail supporting the establishment of a multi-stakeholder 'learning group' approach to conduct diagnostics of what really works and what does not.[16] At the global level, we propose that the N-CFI collaborate with UN-REDD and the FCPF to investigate appropriate fora to promote information exchange, learning, and capacity-building. The Stockholm Water Week is a good model – it is widely recognised as the pre-eminent meeting for the water and sanitation community, it is a regular event convened annually by the same organisation, and it brings together the full range of stakeholders involved in water and sanitation. A similar event – the 'Oslo REDD Exchange' – could bring together the diverse and multiple stakeholders in the REDD community. In addition, the N-CFI needs to maintain support for other fora, especially those that promote south-south dialogue and that have been shown to address the particularly complex issues of governance at the national level.

16. IIED's Forest Governance Learning Group (FGLG) supports forest governance processes in ten countries (see www.iied.org/natural-resources/key-issues/forestry/forest-governance-learning-group).

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Appendix 1. Background papers

Background paper 1
Drivers of land-use change and deforestation in Southeast Asia and the role of payments for environmental services (PES) schemes

Background paper 2
Drivers of land-use change and deforestation in the Amazon Basin and the role of payments for environmental services (PES) schemes

Background paper 3
Drivers of land-use change and deforestation in the Congo Basin and the role of payments for environmental services (PES) schemes

Background paper 4
Land-use change and the application of incentive-led approaches in the miombo woodlands of eastern and southern Africa

Background paper 5
Cost-effective methods for monitoring forest cover changes and associated CO_2 emissions for REDD

Background paper 6
The challenge and importance of baselines for REDD

Background paper 7
Methods to estimate the costs of REDD

Background paper 8
National and international legal frameworks for REDD mechanisms and their relationships with multilateral environmental agreements (MEAs)

Background paper 9
Equity considerations and potential impacts on indigenous or poor forest-dependent communities

Background paper 10
The role of governance in land-use and forest management for REDD

Appendix 2. Terms of Reference

1. Introduction

Approximately 17 per cent of global greenhouse gas emissions are caused by land-use change and, in particular, the destruction of tropical forests (Rogner *et al.* 2007). Reducing land-use change and forest degradation has been shown as a cost effective way of slowing carbon emissions compared to other mitigation strategies such as curbing emissions from power stations (Stern 2007). Decisions taken at the Conference of the Parties to the UNFCCC in Bali, 2007 (COP 13) opened the possibility for Reduced Emissions from Deforestation and Degradation (REDD) payments to become part of the post-Kyoto framework agreement, and for short-term pilot projects. Consequently, the governments of many industrialised countries are announcing significant new funds to tackle climate change[17]. This includes funding mechanisms to reduce emissions from land-use change and deforestation. Much of the global effort to date has been channelled into creating high-level partnerships to administer large funds for REDD over a short timeframe. There has been considerably less effort on thinking through how these new funds will operate at national and local levels. It is imperative that REDD funds are used creatively so that they not only reduce greenhouse gas emissions but also enable forest stakeholders to improve the quality of forest governance. Such a use of funds needs to support the creation of more diverse and robust livelihoods and thereby make a significant contribution to the achievement of the Millennium Development Goals.

2. Problem statement

Financial incentives to achieve changes in land use are not new. For decades industrialised countries have been influencing domestic land-use decisions through a combination of subsidies and regulation (Baylis *et al.* 2008). In developing countries, a range of approaches that include some element of financial incentive have been trialled including: community based natural resource management, joint forest management, integrated conservation and development projects and sustainable forest management.

More recently, stronger direct financial incentives have been applied in payments for environmental services (PES) approaches. Results from these programmes have demonstrated that the incentives need to be substantial, competitive with other land uses and that issues of proprietorship over the benefits are crucial. PES experiences further suggest that 'conditionality' (payments made only upon effective service delivery) constitutes an important element for successful conservation outcomes (Wunder 2008). Above all, the greatest impacts have been where organisations have invested in long-term locally adaptive and relevant processes (Frost and Bond 2008).

17. Examples of funds are the UK Government's Environmental Transformation Fund (ETF), The World Bank's Climate Investment Fund, and Norway's Climate Forest Programme.

As interest in REDD grows, and the global political imperative to implement these programmes gathers pace, there is a real possibility that many of the hard-learned lessons of forest management and underlying causes of deforestation will be ignored. Insights from decades of research and practice in tropical forest management reveal that typical barriers to effective forest management include insecure property rights, lax law enforcement, weak deforestation monitoring, reduced access to credits, remoteness, capacity shortcomings, and low stakeholder participation (Chomitz *et al.*, 2006). Therefore, an immediate risk of REDD is the marginalisation of forest-dependent communities due to legal-institutional and capacity constraints.

While experience in forest management can provide important insights for micro-level design, a new element of REDD schemes refers to the institutional architecture required to define how payments flow from the international level to local land users. The presence of a strong and credible institutional framework is essential not only to ensure a fair and efficient money flow from governments to forest stewards, but also to increase investor confidence (from donors and Kyoto Annex I countries) that the purchase of emission is matched by reductions on the ground. Relevant insights could be drawn from national level PES schemes, such as in Costa Rica and Mexico, which addressed how money can flow from national to local levels. Additional lessons for direct flows of international money to local projects could be provided by clean development mechanism (CDM) experiences. Institutional frameworks allowing for both direct flows of international money to local land users/projects and via government as intermediaries still need to be designed and tested.

3. Review methodology and outputs

REDD schemes entail large-scale payments for ecosystem services – with the primary service delivered being a reduction in greenhouse gas emissions. Over the last few years, there have been several important reviews of payments for ecosystem services (for example: Swallow *et al.* 2007; Wunder *et al.* 2008 and Porras *et al.* 2008). This review will build on existing literature to develop a set of design criteria that will inform the Norwegian Climate Forest Initiative. To do this we have identified three basic steps to our work:

1. Regional review of the performance of PES and other payment-based initiatives, in four regions
2. Review of the state of current knowledge and future challenges on a number of cross cutting issues
3. Recommendations and design criteria for Norway's Climate Forest Initiative

3.1 Regional studies of the performance of PES schemes

The project team will conduct literature reviews of the performance of PES initiatives in the following regions:

- The Amazon (CIFOR)
- The Congo Basin (WRI)
- The miombo Eco-Region of southern Africa[18] (IIED)
- Southeast Asia (CIFOR)

The utility and value of these studies will depend largely on the application of a robust framework, which will be developed as a priority in the first few weeks of the project. The framework will need to recognise the important differences between public schemes (for example the Sloping Lands Conversion Programme in China) and private-funded PES schemes. The framework will include the following elements:

- Brief review of extent and key drivers of land-use change and deforestation over the last 20 years
- Summary of the scientific evidence and quantification of greenhouse gas emissions from land-use change and degradation
- Identification of a sub-set of PES programmes and projects in each region with an emphasis on carbon but including water and bio-diversity where appropriate
- Review of this sub-set of PES and other incentive-driven programmes for impacts on land-use change (biophysical) and people's livelihoods with specific reference to equity
- Briefly assess some of the key elements such as monitoring, permanence, leakage, additionality, scale and cost-effectiveness of the identified programmes and projects
- An overall assessment of the probability of REDD payments achieving sustainable development goals at scale

3.2 Cross-cutting issues

Potential REDD mechanisms face a number of specific technical challenges. Some solutions will be derived from current PES mechanisms, while other solutions will require further innovation. Potential cross cutting issues include:

- The establishment of *baselines* against which a reduction in deforestation, degradation and land-use change can be measured
- Cost-effective techniques for *monitoring and validation of changes* in land-use (including deforestation and degradation)
- National and international *legal frameworks for REDD mechanisms* and their relationship with Multilateral Environmental Agreements
- International, national and local level *governance* and its relationship with land-use change and forest management
- Equity considerations and potential impacts on *indigenous or poor forest dependent* communities

18. The miombo Eco-region is the major ecological zone of southern and eastern Africa, a large area of savanna woodland and associated wetlands in southern and eastern Africa covering 3.6 million km² of the following 11 countries: Angola, Botswana, Burundi, Democratic Republic of Congo (DRC), Malawi, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe. It is an open canopy landscape upon which people are highly dependent and is also being subject to major land-use change.

- Methods for estimating the *opportunity costs* of land-use change and the transaction costs of developing large-scale REDD mechanisms

Each of the cross-cutting issues will be investigated by a lead researcher from CIFOR, IIED or WRI. Their review will form a short background paper, from which key lessons and recommendations can be fed into the main report. The background papers will be available as appendices to the main report.

3.3 Design criteria for Norway's Climate Forest Initiative

The performance of existing PES schemes and the technical cross-cutting analyses will be used to develop a generic set of design criteria for REDD projects by Norway's Climate Forest Initiative that improve the probability of achieving the goal of sustainable development. Where appropriate the report will also make region-specific recommendations on the implementation of REDD type initiatives.

3.4 Proposed output

The final report will be a concise, readable document supported by appendices (including the regional case studies and other technical reports). Its purpose will be to inform and shape the development of the Norwegian Climate Forest Initiative.

Natural Resource Issues

If poverty is to be reduced and livelihoods improved, significant shifts in policies, institutions and markets will be required to encourage sustainable natural resource management. How to go about this is a major challenge facing governments and civil society groups. Much guidance is available for farming, forestry and fisheries, but in reality livelihoods depend upon many forms of natural capital and are not amenable to sectoral interventions. This series of reports aims to present material on key cross-cutting themes of significance to many natural resource sectors, including water, soil, biodiversity, carbon and climate.

Other reports in the Natural Resource Issues Series are available from IIED on request and can be downloaded from www.iied.org:

1. Rural livelihoods and carbon management. 2000. Bass *et al.*
2. Laying the foundations for clean development: preparing the land use sector. A quick guide to the clean development mechanism. 2002. Auckland *et al.*
3. Integrating global and local values: a review of biodiversity assessment. 2002. Vermeulen and Koziell.
4. Local action, global aspirations: The role of community conservation in achieving international goals for environment and development. 2006. Roe *et al.*
5. Towards better practice in smallholder palm oil production. 2006. Vermeulen and Goad.
6. Environment at the heart of Tanzania's development: Lessons from Tanzania's National Strategy for Growth and Reduction of Poverty (MKUKUTA). 2007. Assey *et al.*
7. Fair deals for watershed services in Bolivia. 2007. Asquith and Vargas.
8. Fair deals for watershed services in the Caribbean. 2007. McIntosh and Leotaud.
9. Fair deals for watershed services in Indonesia. 2007. Munawir and Vermeulen.
10. Fair deals for watershed services in India. 2008. Agarwal *et al.*
11. All that glitters: A review of payments for watershed services in developing countries. 2008. Porras *et al.*
12. Fair deals for watershed services in South Africa. 2008. King *et al.*
13. Fair deals for watershed services: Lessons from a multi-country action-learning project. 2009. Bond and Mayers.
14. Creating and protecting Zambia's wealth: Experience and next steps in environmental mainstreaming. 2009. Aongola *et al.*
15. Tenure in REDD: Start-point or afterthought? 2009. Cotula and Mayers.

Incentives to sustain forest ecosystem services: A review and lessons for REDD

Approximately 17 per cent of global greenhouse gas emissions are caused by land-use change and, in particular, the destruction of tropical forests. Reducing land-use change and forest degradation has been shown as a cost-effective way of slowing carbon emissions compared to other mitigation strategies such as curbing emissions from power stations. Decisions taken at the UN Conference of the Parties in Bali, 2007 opened the possibility for reducing emissions from deforestation and degradation (REDD) payments to become part of the post-Kyoto framework agreement, and for short-term pilot projects. Consequently, the governments of many industrialised countries are announcing significant new funds to tackle climate change.

The Government of Norway, through its International Climate and Forest Initiative, will allocate up to NOK3 billion (approximately US$430 million) a year between 2009 and 2012 to mitigate greenhouse gases produced by land-use change. An assessment of payments for ecosystem services as a tool for REDD was commissioned by the Government of Norway to inform the International Climate and Forest Initiative. This report is a summary of ten papers which made up the assessment and it represents preliminary research, analysis and recommendations to stimulate timely discussion and critical feedback.

The opinions expressed here are those of the authors and not necessarily those of the institutions involved, nor the Norwegian Government.

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